

CLAIMS

What is claimed is:

1. An EMI shield having at least one compartment for enclosing circuitry of an electronic device, said shield comprising:
 - a first member formed of a thin metal sheet; and
 - a second member formed of an electrically-conductive composite material comprising an admixture of a polymeric component and an electrically-conductive particulate filler component, the second member being integrally joined to the first member, and having at least one wall which extends from the first member and which together with the first member defines at least a portion of said compartment.
2. The shield of claim 1 wherein the polymeric component comprises one or more thermosetting or thermoplastic polymers or co-polymers, or a blend thereof.
3. The shield of claim 1 wherein the polymeric component is selected from the group consisting of epoxies, phenolics, poly(ether ether ketones), polyimides, polyolefins, polyetherimides, polybutylene terephthalates, polyethylene terephthalates, nylons, polyamides, fluoropolymers, polysulfones, polyesters, acetal homo and copolymers, liquid crystal polymers, polyacrylics, polymethylacrylates, poly(ester and ether urethanes), polyurethanes, acrylonitrile-butadiene-styrene, polyvinyl chlorides, polyphenylene ethers, polyphenylene oxides, polystyrenes, polycarbonates, and copolymers and blends thereof.
4. The shield of claim 1 wherein the shield exhibits an EMI shielding effectiveness of at least about 60 dB substantially over a frequency range of between about 10 MHz and about 10 GHz.
5. The shield of claim 1 wherein the composite material has a volume resistivity of not greater than about 1,000 Ω -cm.

6. The shield of claim 1 wherein the composite material comprises between about 5-95% by weight of the filler component.

7. The shield of claim 1 wherein the metal sheet has a thickness of not greater than about 10 mils (0.125 mm).

8. The shield of claim 1 wherein the wall of the second member has a thickness of between about 3-10 mil (0.075-0.254 mm).

9. The shield of claim 1 wherein the second member is self-bonded to the first member.

10. The shield of claim 1 wherein the sheet is formed of aluminum, zinc, magnesium, steel, or a combination or alloy thereof.

11. The shield of claim 1 wherein the wall extends from the first member to an end surface, the end surface being disposable on a part of the device.

12. The shield of claim 11 further comprising an electrically-conductive layer or gasket disposed on the end surface.

13. The shield of claim 12 wherein the electrically-conductive layer comprises a metal or a resin filled with electrically-conductive particulates.

14. The shield of claim 12 wherein the gasket comprises an elastomeric resin filled with electrically-conductive particulates.

15. The shield of claim 12 wherein the gasket or layer is self-adherent on the end surface.

16. The shield of claim 1 wherein the electrically-conductive particulate filler component comprises electrically-conductive fibers.

17. The shield of claim 16 wherein the electrically-conductive fibers are selected from the group consisting of: graphite, carbon, inherently-conductive polymer, and metal fibers; metal or non-metal fibers having an electrically-conductive coating; and mixtures and combinations thereof.

18. The shield of claim 17 wherein the electrically-conductive coating comprises one or more layers of carbon, graphite, or one or more inherently-conductive polymers or metals, or a combination thereof.

19. The shield of claim 16 wherein the fibers have an average length of between about 0.004-1 inch (0.1-25 mm).

20. An assembly for the EMI shielding of circuitry of an electronic device, the assembly comprising:

an EMI shield having at least one compartment, the shield comprising:

a first member formed of a thin metal sheet; and

5 a second member formed of an electrically-conductive composite material comprising an admixture of a polymeric component and an electrically-conductive particulate filler component, the second member being integrally joined to the first member, and having at least one wall which extends from the first member and which together with the first member defines at least a portion of said compartment,
10 the compartment being received over the circuitry of the device.

21. The assembly of claim 20 wherein the polymeric component comprises one or more thermosetting or thermoplastic polymers or co-polymers, or a blend thereof.

22. The assembly of claim 20 wherein the polymeric component is selected from the group consisting of epoxies, phenolics, poly(ether ether ketones), polyimides, polyolefins, polyetherimides, polybutylene terephthalates, polyethylene terephthalates, nylons, polyamides, fluoropolymers, polysulfones, polyesters, acetal homo and copolymers,
5 liquid crystal polymers, polyacrylics, polymethylacrylates, poly(ester and ether urethanes),

polyurethanes, acrylonitrile-butadiene-styrene, polyvinyl chlorides, polyphenylene ethers, polyphenylene oxides, polystyrenes, polycarbonates, and copolymers and blends thereof.

23. The assembly of claim 20 wherein the shield exhibits an EMI shielding effectiveness of at least about 60 dB substantially over a frequency range of between about 10 MHz and about 10 GHz.

24. The assembly of claim 20 wherein the composite material has a volume resistivity of not greater than about 1,000 Ω -cm.

25. The assembly of claim 20 wherein the composite material comprises between about 5-95% by weight of the filler component.

26. The assembly of claim 20 wherein the metal sheet has a thickness of not greater than about 10 mils (0.125 mm).

27. The assembly of claim 20 wherein the wall of the second member has a thickness of between about 3-10 inch (0.075-0.254 mm).

28. The assembly of claim 20 wherein the second member is self-bonded to the first member.

29. The assembly of claim 20 wherein the sheet is formed of aluminum, zinc, magnesium, steel, or a combination or alloy thereof.

30. The assembly of claim 20 wherein the wall extends from the first member to an end surface, the end surface being disposed on a part of the device which together with the compartment encloses the circuitry.

31. The assembly of claim 30 further comprising an electrically-conductive layer or gasket interposed between the end surface and the device part.

32. The assembly of claim 31 wherein the electrically-conductive layer comprises a metal or a resin filled with electrically-conductive particulates.

33. The assembly of claim 31 wherein the gasket comprises an elastomeric resin filled with electrically-conductive particulates.

34. The assembly of claim 31 wherein the gasket or layer is self-adherent on the end surface.

35. The assembly of claim 20 wherein the electrically-conductive particulate filler component comprises electrically-conductive fibers.

36. The assembly of claim 35 wherein the electrically-conductive fibers are selected from the group consisting of: graphite, carbon, inherently-conductive polymer, and metal fibers; metal or non-metal fibers having an electrically-conductive coating; and mixtures and combinations thereof.

37. The assembly of claim 36 wherein the electrically-conductive coating comprises one or more layers of carbon, graphite, or one or more inherently-conductive polymers or metals, or a combination thereof.

38. The assembly of claim 35 wherein the fibers have an average length of between about 0.004-1 inch (0.1-25 mm).